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# first, seal your house



**...then look at your insulation  
and heating system**



Ontario

Ministry of  
Municipal Affairs  
and Housing

Hon. Claude F. Bennett  
Minister



Energy  
Ontario

This booklet has been prepared especially for Ontario homeowners by the Ministry of Municipal Affairs and Housing. It is based on the booklet "Seal Your House Before Reinsulating", distributed by Office of Energy Conservation, Saskatchewan Mineral Resources. Renewable Energy in Canada acted as consultant for the revision.

Renovation and Energy Conservation Unit  
Ministry of Municipal Affairs and Housing  
Queen's Park, Ontario

September, 1981

The Ontario government has established the goal of improving the energy-efficiency of the average Ontario household by 30 per cent by 1995.

All of us can accomplish this goal and many of us can go beyond it. This pamphlet suggests some of the ways this can be achieved. Its aim is to help you save energy and money while at the same time creating a more comfortable house.

Reducing excessive air leakage in your house is the easiest and least expensive measure you can take to reduce your energy consumption. By following the sealing guidelines in this pamphlet you should be able to reduce your fuel bill by 10 to 15 per cent.

By adding insulation and then ensuring that you have the right heating system and it is maintained in top shape you should reduce your fuel consumption another 20 per cent or more.



# Three Steps to an Energy-Efficient Home

**First** — Stop air leaks

**Second** — Insulate

**Third** — Ensure you have the right heating system and maintain it in top shape

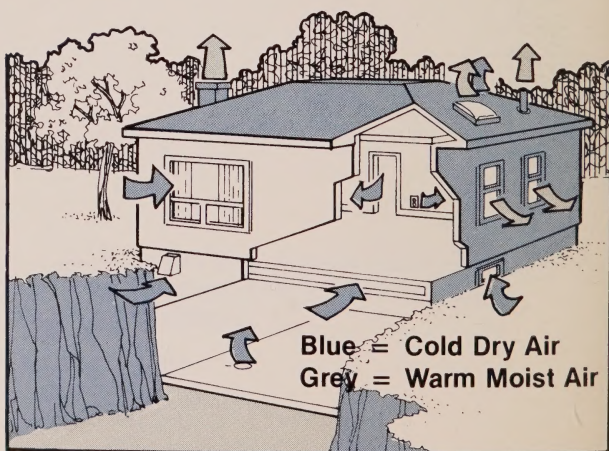
## Why You Should Stop Air Leaks Before Insulating:

### 1. To Avoid Possible Condensation Problems in the Attic

In most houses, warm moist air escapes from the house into the attic through tiny cracks, holes for plumbing and electrical fixtures, and other openings. Some of this moisture condenses and freezes in the attic, but usually does not cause problems if the ventilation — the flow of dry outside air through the attic — is adequate.

When insulation is added to the attic without first plugging the leaks, warm moist inside air continues to enter the attic through cracks and holes. The added insulation will only further lower the temperature of the attic space. Because the colder air cannot hold as much moisture, more water vapour condenses and freezes in the attic. A large amount of frost buildup can cause serious problems when it melts in the spring.

So, doing your best to seal cracks and openings reduces the chances of serious condensation problems. Even better, your fuel bills will be lower because by preventing warm air from escaping into the attic lesser



amounts of cold air will be drawn into the main part of the house from the basement and through windows and doors.

If your house has poor attic ventilation or is electrically-heated and has no chimney the chances of attic condensation problems are even greater. In general there should be 1/10 square meter of unobstructed ventilation openings for each 30 square metres of ceiling area. (1 square foot for each 300 square feet.) Power ventilation is not a good alternative for adequate natural ventilation measures. It can make the problem worse by pulling greater amounts of moist air from the house into the attic.

## **2. To Reduce Infiltration of Outside Air and Help Prevent Cold Drafts**

Air leaking into the house through cracks, around windows, doors, and other places accounts for 30 to 40 percent of the heat loss of the typical home.

Under normal conditions most homes experience a complete air change every two hours. On windy days, the air change can take place every hour. Generally speaking, the older the house the greater the rate of air leakage. This means your furnace is working overtime to heat the cold air which is constantly leaking into the house.

If you properly seal and weatherstrip your home, you can save ten to twenty per cent of your bill. Since the materials usually cost less than your annual savings, they will pay for themselves within the first year. Materials usually cost between \$50 and \$100.

Reducing the air leaks also stops cold drafts and makes your house much more comfortable.

## **3. It Is Much Easier to Seal Air Leaks Before Adding Insulation**

Resist the temptation to rush into insulating without first sealing your house. A little more time and a few extra dollars spent in sealing your house could save you the difficulty and expense of correcting serious infiltration and condensation problems in the future.

## First, Seal Your House

Use good quality materials. The use of poor materials may necessitate redoing the job in three months or a year.

Weatherstripping is used in moving joints, such as windows and doors, and it should be able to withstand a constant stress.

Caulking materials should remain elastic and not dry or crack. Resin-or oil-based caulking materials are generally a poor choice as they break down quickly. Silicone sealant, although expensive, has proven to be the best choice in most instances. Acoustical sealant is an inexpensive substitute for silicone wherever the caulking job is out of sight and touch. The spray cans of foam are useful where there is a wide crack to be filled.

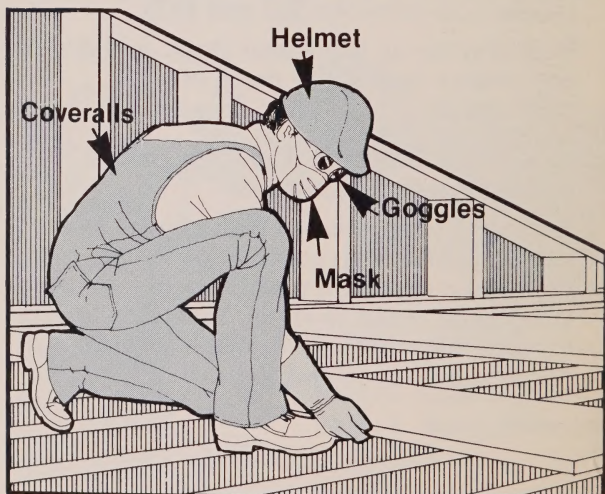
Your building supplier will have most of these materials.

Identifying many of the air leaks is easy. With the back of your hand, or a piece of tissue hung from a coat hanger you can locate cold drafts. Exploring your house like this is a good project for a windy day.

For best results, check the west wall when the wind is from the west, the east wall when the wind is from the east, and so on.

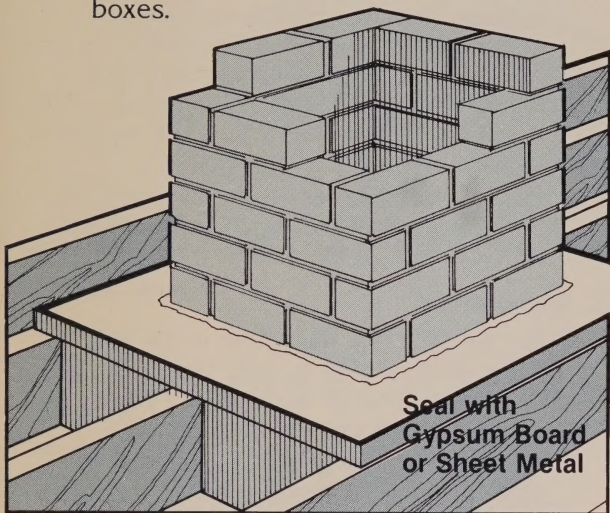
### 1. Attic

The attic is often a dirty and uncomfortable area to work in. But because the attic is a major source of air leakage and potential moisture accumulation, it is well worth spending time to seal air leaks.

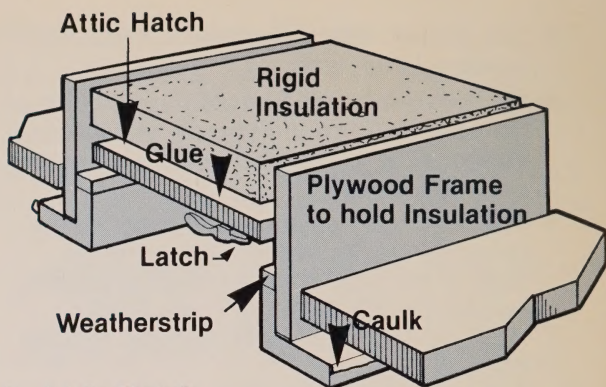




- Use proper safety equipment when working in the attic.
- Place two or more boards over the top of the joists to form a walkway. Do not step between the joists. The ceiling below will not support you.
- Pull back the insulation where necessary to locate cracks formed along interior walls. If the attic contains loose insulation, sweep it aside. Seal the cracks with caulking compound and carefully replace the insulation.
- Carefully caulk around the holes for electrical wiring and seal around electrical boxes.



- Use caulking compound and a 6 mil polyethylene sheet to seal around plumbing vents where they pass through the attic floor. You can also place extra insulation around the vents.
- If possible replace any recessed light fixtures which penetrate into the attic with fixtures mounted on the surface of the ceiling below. They are easier to seal and it is possible to insulate them.
- Because the chimney gets so hot normal sealing procedures are not acceptable. Accurately cut two pieces (single thickness) of sheet metal to fit around the chimney. Caulk the metal to the chimney using a muffler or furnace cement. Do not place any insulation within 5 cm (2 inches) of the chimney. Construct a 30 cm high (12 inch) plywood fence to keep loose insulation away from the chimney.



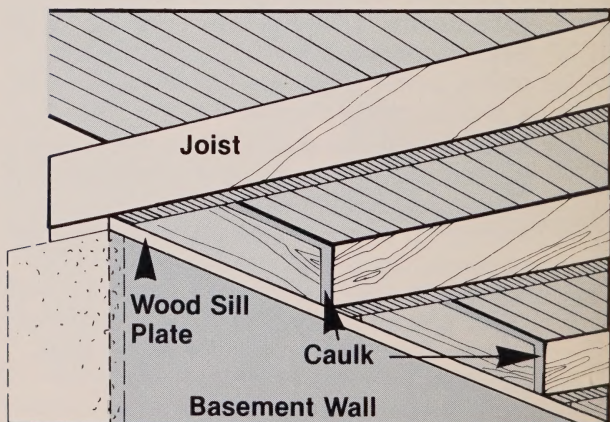
## 2. Attic Hatch

- Your attic hatch is just like a door to the outside. Seal around the frame and between the casing and the ceiling plasterboard. Apply weatherstripping along the edges of either the casing or the hatch itself. Install latch closures to ensure that the hatch panel fits snugly.
- Now that you have weatherstripped the hatch, insulate it by attaching insulation to the attic side of the access panel.

## 3. Basements

After the attic, the basement is the next most important area to seal. Up to 25 per cent of your total air leakage can come through your sill plate alone.

- Seal the joint between the wooden sill plate and the foundation wall. If the joists are embedded in a concrete foundation, it will be necessary to check for leaks around each joist and along the joint where the masonry meets the sub-floor above you. Fill large holes and cracks with fibreglass or oakum before caulking.

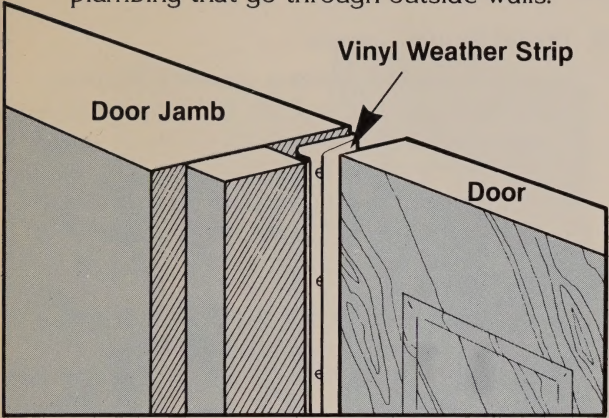




Check the label of the caulking component to see whether it is recommended for use on concrete.

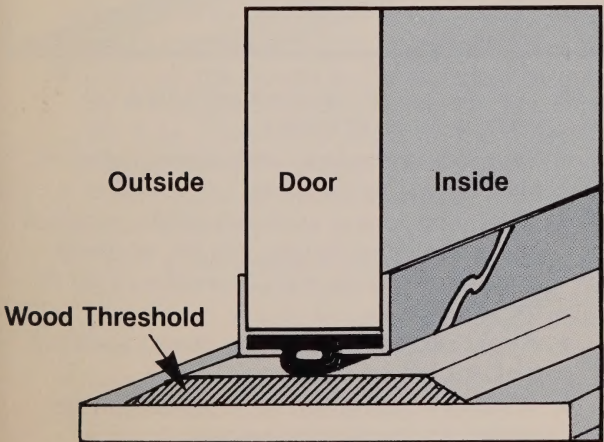
It is difficult to reach the sill plate in a finished basement. However, often you can easily remove the tiles from around the edges of the ceiling.

- Caulk around the holes for wiring and plumbing that go through outside walls.



#### 4. Wood Doors

- Install good quality weatherstripping such as spring metal or a good quality plastic. Self-tapping screws work best to hold it in place.
- Attach door sweeps to the door bottoms or weatherstripping that fits under the door or on the threshold below the door when it is closed.
- Weatherstrip storm doors and mail slots.
- If it is practical, seal around door windows on the inside with silicone seal.



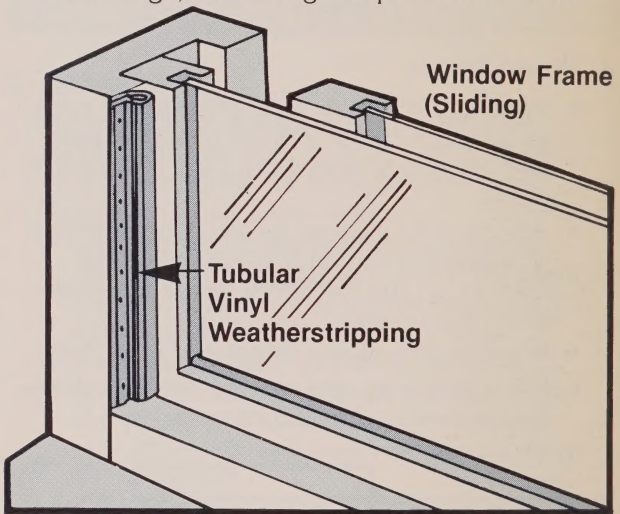
- If your door is badly worn or warped, consider replacing it with a solid insulated door at least 5 cm (2 inches) thick. Adding a storm door is a much less effective alternative, but still makes good sense.
- Remove the inside door trim if possible. Insulate any large openings between the door frame and the wall. Seal all cracks and replace the trim.

## 5. Metal Doors

- Make sure the existing weatherstripping has a good seal and has not worn or come apart. Replace it with new weatherstripping if necessary.
- Attach door sweeps to the door bottoms or threshold weatherstripping.

## 6. Windows

Old windows, especially the double-hung type, can contribute significantly to air-leakage, on average 15 per cent or more.

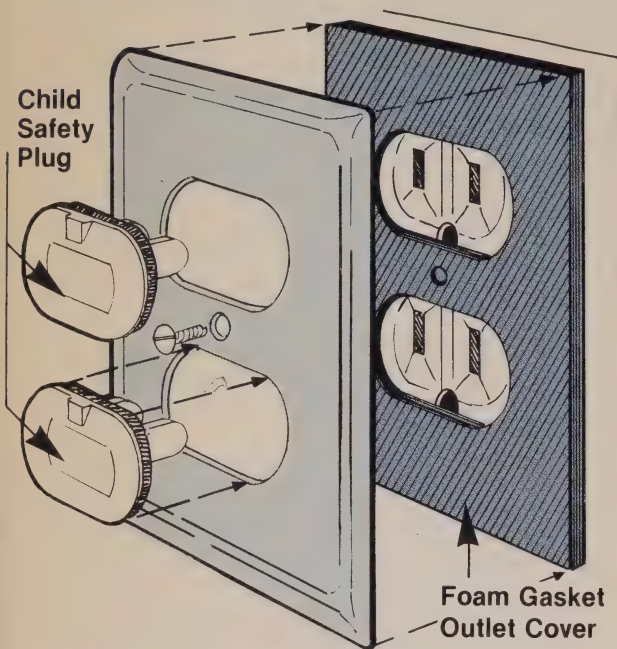


- Seal swing-out windows with stick-on foam weatherstripping.
- Seal sliding windows with spring metal or plastic weatherstripping.
- Weatherstripping windows on the inside is easier and lasts longer, but for aesthetic reasons you may wish to weatherstrip on the outside.
- Apply silicone seal to any storm windows that are left on year round.
- Windows that are never opened can be sealed shut with silicone seal.

- Seal all gaps between the window trim and the wall. If possible, remove the trim. Insulate large holes and caulk all cracks. Replace the trim.

## 7. Milk Chute

- If it is not in use, stuff it with fibreglass insulation and seal it with silicone seal. If it is in use, apply a suitable weatherstripping.



## 8. Electrical Outlets and Switches

In some houses, fully twenty per cent of all air leakage may be through electrical outlets and switches. Although most of this occurs on outside walls, even outlets on inside walls can experience leakage. Air will find its way through the wall partition to the outside wall.

- Turn off the power to the outlet or switch by tripping the circuit breaker or removing the fuse. Check to make sure the power is disconnected by plugging in a lamp.
- Remove the cover plate with a screwdriver.
- Place a foam gasket (available from most hardware stores) over the receptacles and switch boxes. Replace the cover plate and turn the power back on.
- Install child safety plugs in outlets that you do not use. This will prevent drafts through the outlet holes. Foam gaskets



are also available that fit around the plugs to minimize air leaks.

- Never put any insulating or other foreign material inside the electrical outlet box.

## 9. Fireplaces

Conventional fireplaces are generally energy wasters. Your house loses more heat, as warm air is drawn up the chimney, than it gains from the fireplace. To reduce heat loss from your fireplace.

- Close the damper when the fireplace is not in use. Make sure the fire has died out completely.
- Check that the damper closes snugly. If it doesn't, clean or replace as necessary.
- Use caulking compound to seal the area where the fireplace joins the outside wall.
- A major source of air leakage can be found around the chimney of a free-standing fireplace. Accurately cut two pieces (single thickness) of sheet metal to seal around the chimney. (See diagram of furnace chimney.)
- Make an insulated fireplace plug that fits snugly into the opening to use when there is no fire. Glass doors on the fireplace do not generally give a good seal. They are still a good idea, but only if you have a modern chimney built to withstand the higher flue temperatures that glass doors create. If in doubt have your flue checked by an expert.
- Some fireplaces use outside air for combustion, so they draw very little heated room air up the chimney. Unlike conventional designs, fireplaces with glass doors, heat exchangers and fresh air intakes add heat to the home when they are in operation. You can add a fresh air intake by running a 13 cm (5 inch) duct from the outside basement wall to the fireplace grate area. A manual damper will open or close the fresh air intake.
- If your fireplace does not have a fresh air intake, open a small window when it is in use. This will help to ensure that toxic fumes are not pulled down the furnace chimney. The draft caused by the fireplace can be strong enough to draw fumes down the furnace chimney even when the furnace is operating.

## **10. Baseboards**

- If there is a crack between the baseboard and the wall, seal along the edges of the baseboard with clear silicone sealant.
- If it is possible to remove the baseboard, caulk between the wall board and the floor.
- Lift wall-to-wall carpet away from the wall off the nailer strips. Caulk underneath the baseboard as deeply as possible. Replace the carpet.

## **11. Vents**

- Check vents from bathroom fans, stove hoods, clothes dryers, etc. to see that they are vented to the outside (and not the attic!) and that the flaps are closing properly when not in use. Check the seal around the vents where they penetrate the exterior wall. Caulk if necessary.
- Tape the joints in all duct piping, including furnace heat ducts, especially where they pass through the attic or other unheated space.

## **12. Other Things You Can Do**

- Make sure doors are not left or held open for long periods during the winter months.
- Open windows for ventilation and operate vents only when absolutely necessary. Some stove vents, for example, can exhaust the entire volume of house air in only 20 minutes.

## **13. Air Quality**

Maintaining fresh indoor air quality is very important. The measures for energy conservation outlined in this pamphlet should not reduce the rate of ventilation to such an extent as to affect the safe and efficient operation of your combustion equipment or create serious humidity and air quality problems.

Humidity problems are the first sign of inadequate ventilation. An early warning will be excessive condensation collecting on double-glazed windows. This is more likely to occur in newer and electrically heated homes. There is a wide range of solutions to humidity problems, from the occasional venting of bathrooms to installing an outside air duct to your furnace.

If you have any questions or concerns on air quality or humidity problems consult the ministry's fact sheet on fresh air and humidity control in a tighter house.

### **...Next, Add Insulation**

After you have sealed your house and reduced the levels of uncontrolled air leakage, you should plan an insulation programme. Obtain a copy of "Keeping The Heat In". This is an excellent booklet produced by the federal government.

Although it is a popular place to begin, the attic is often not the best place to start to insulate. In general your insulation priorities should be in this order:

1. Uninsulated basements walls or uninsulated attics that are easy to get at. Insulating these areas always pays.
2. Insulated areas such as attics that are easy to get at.
3. Uninsulated walls.
4. Areas that have some insulation and are difficult to get at (such as walls) are usually only economic to insulate when you are renovating.

There are two approaches to re-insulation:

#### **Do-it-yourself**

Purchase only approved materials, rent or obtain the proper tools and use safety equipment. Planning ahead will ensure that your time and money are well spent.

**OR**

#### **Hire a Contractor**

Get two or three estimates and a written guarantee that only Standards Council of Canada approved materials will be used. Your contractor should be certified under the Canadian General Standards Board Certification Program.

### **Helpful Hints for Insulating**

Plan your insulation schedule carefully! If you are doing the work yourself be sure to read "Keeping The Heat In". It contains a few simple but very important safety rules that must be followed.

Here are some general principles to remember.



## Basement

- Install insulation on uninsulated areas.
- Don't forget to insulate between the floor joists along the outer walls.

## Walls

- If your walls are not insulated, insulation can be blown in by a contractor. This is expensive, but it can pay for itself in about ten years.
- Blowing insulation into walls that already have some insulation is usually not economical or very effective.

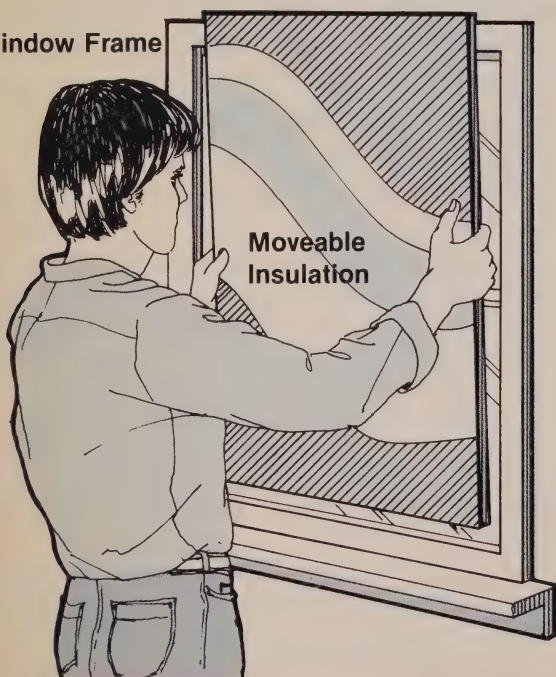
## Attic

- Add insulation if the depth of the existing insulation is less than 15 cm - RSI 3.5 (6 inches - R20).
- Often a contractor can blow in insulation as cheaply as you can install it yourself. Get two or three estimates for installing the same R-value.
- Be careful when installing insulation near wires, electrical motors, fans, recessed light fixtures and chimneys. Consult "Keeping the Heat In" for specific guidelines.

## Windows

- All windows should have at least double panes or be fitted with storm windows. In the

Window Frame



north triple glazing is often economical if you are replacing windows. Ensure they have a 1.3 cm ( $\frac{1}{2}$  inch) air gap between each pane.

- Moveable insulation used on windows at night or when they are not used for light or view will save energy. Many insulating blinds and shutters are available, or better yet, you can make your own. To prevent any condensation buildups on the glass make sure that the edges fit snugly.
- A cheaper alternative is to install home-made storm windows made of acrylic or plastic sheets. These can considerably reduce air leakage and heat loss from older windows.
- If there are windows in cupboards or basements which aren't used for light or ventilation consider taking them out. Insulated walls lose far less heat than a comparable window area.

## **Renovations**

If you are renovating your house you can use the opportunity to make it more energy-efficient. Some jobs, such as insulating partially insulated walls, are just too expensive to do on their own. Renovating either the interior or exterior of the house will allow you to install high levels of insulation as well as a continuous air-vapour barrier, both of which are critical to energy conservation. Obtain a copy of the ministry's Energy Check List for Renovators if you are planning any work on your house.

## **...Ensure You Have the Right Heating System**

An efficiently operating heating system will save you money.

Many homeowners will want to take advantage of the Canada Oil Substitution Program (COSP). This program provides a taxable grant of up to one half the cost to \$800.00 of switching from oil to gas, electric heating, solar or wood.

The best time to consider replacing your heating system is *after* sealing and insulating. Your total heating demand will now be considerably reduced, allowing you to buy a smaller, more appropriately sized unit.

The decision concerning which system to install should be made with care. There are a number of factors, including cost, efficiency, availability of the energy source in your region, the

compatibility of the new system with your house and your own preferences. Make sure you are installing the most efficient system available. For example, a gas furnace with electric pilot light and automatic flue damper will be 15 per cent more efficient than a conventional gas unit.

As well, super-efficient units tested at 95 per cent efficiency, are coming onto the market. These are also more expensive so take your time and compare systems. COSP is available through to 1990 so you have the time to make the best choice.

Whichever system you decide on should always be kept in top shape. Keep it cleaned and tuned regularly. "The Bill Payers Guide to Furnace Efficiency" outlines a proper service schedule for your system.

Generally, oil furnaces should be completely serviced once a year, gas furnaces at least every second year. Servicing takes time, a couple of hours, and should be done with proper instruments.

There are other measures to keep your system in top shape:

- Clean or change furnace filters regularly (once a month during the heating season). Dirty filters can cause your furnace to use up to 25 per cent more fuel.
- Make sure heating registers and cold air returns are not obstructed by drapes or furniture.
- The thermostat should be located on an inside wall where it is not affected by cold drafts or heat from the sun, appliances, or lights. Consider moving the thermostat if it is poorly located.
- Keep the furnace fan belt at the correct tension, and replace worn belts. Lubricate the fan as necessary.



## Assistance Programs

There are a number of government assistance programs available to qualified homeowners. Contact the Ministry of Municipal Affairs and Housing, your municipality, utility, CHIP or the federal Conservation and Renewable Energy Council for specific information.

**OHRP** *Ontario Home Renewal Program*

If your family income is \$15,500 or less after allowable deductions you may qualify for OHRP. Grants and loans are available for owner occupants to repair their homes to local standards.

**REAP** *Residential Energy Advisory Program*

Loans are offered at Ontario Hydro's borrowing rate (currently about 5% below market). These can be used to upgrade the energy-efficiency of your house. The program is offered by Ontario Hydro in parts of its rural service area. Many local utilities are expected and authorized to introduce a similar program — many already offer energy conservation advice. Call yours and ask.

**RRAP** *Residential Rehabilitation Assistance Program*

This program can be used for insulation and weatherization, but is only available in certain designated areas. Check with your local municipality for further details.

**COSP** *Canada Oil Substitution Program*

The federal government is encouraging the use of Canadian gas, electricity and non-renewable (sun, wood, etc.) energy instead of imported oil. COSP provides a taxable grant of up to \$800 for homeowners and businesses that convert from oil. The grants are available for 10 years so there's plenty of time to investigate your alternatives.

**CHIP** *Canadian Home Insulation Program*

CHIP is a federal program which provides a taxable grant of up to \$350 for materials and up to \$150 to cover one third of the labour cost of installation. Many homeowners use this grant to insulate their attics but it can be used for weatherization, insulation in the basement and other areas, as well as for insulated shutters.

## **Further Information**

Housing Renovation and Energy  
Conservation Unit  
Ministry of Municipal Affairs and Housing  
Queen's Park, Toronto  
(416) 965-4073

Free copies of the following are available:

- Fact Sheet on moisture and ventilation control
- Energy checklist for renovators: to make the most of your renovation efforts
- Information and reports on the Ontario Weatherizing Project

### **Enersave Heatline**

a toll free line to answer your questions on insulation, weatherization, furnace maintenance and federal programs and literature.

1-800-267-9563 (toll free)

995-1845 (in Ottawa)

### **The Federal Conservation and Renewable Energy Council**

2242 Lakeshore Blvd. West  
Toronto, Ontario  
M8V 1A5

1-800-268-2207 (toll free)

252-5866 (in Toronto)

for information on COSP ("Off-Oil") and copies of "Keeping the Heat In" and "Bill Payers Guide to Furnace Efficiency".

For information on the CHIP grants

1-800-268-1818 (toll free)

789-0581 (in Toronto)

P.O. Box 1270

Station "T"

Toronto, Ontario

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Renovation and Energy Conservation Unit  
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